



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,653	07/27/2004	David J. Bain	FIS920040119US1	4652
29371 7590 03/26/2007 CANTOR COLBURN LLP - IBM FISHKILL 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			EXAMINER ROMAN, LUIS ENRIQUE	
			ART UNIT	PAPER NUMBER
			2836	

  

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/26/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/710,653		BAIN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Luis Roman		2836	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 December 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/12/06 has been entered.

Applicant amendment filed on 12/12/06 has been entered. Accordingly claims 2-5, 7-11 & 15-18 have been kept original, claims 1, 6 & 14 have been amended, claims 12, 13 & 19 have been previously presented and no claims have been cancelled. New claim 20 was added. It also included remarks/arguments.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-2 & 20** are rejected under 35 U.S.C. 102(b) as being anticipated by Kawakami et al. (US 5542559).

Regarding claim 1, Kawakami et al. discloses an electrostatic chuck (F.1) with a plurality of gas channels (54), a bi-directional backside conduit (5, 5A, 5B) in communication with a gas supply (56) and a vacuum (57), wherein the gas channels are

Art Unit: 2834

configured to facilitate vacuum assisted chucking of the wafer retained on said electrostatic chucking pedestal (C.7 I.14-19).

Regarding claim 2 Kawakami et al. discloses the apparatus of claim 1. Kawakami et al. further discloses comprising means for selectively coupling to one of said backside said bi-directional backside conduit carrier gas supply line and said vacuum supply line (F.1 e.V1 & V2).

Regarding claim 20, Kawakami et al. discloses an electrostatic chuck (F.1) with a plurality of gas channels (54) in communication with a bi-directional backside conduit (5, 5A, 5B), wherein the gas channels are configured to facilitate vacuum assisted chucking of the wafer retained on said electrostatic chucking pedestal (C.7 I.14-19).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 3-4** are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. (US 5542559) in view of Deguchi et al. (US 5665166).

Regarding claim 3 Kawakami et al. discloses the apparatus of claim 2.

Kawakami et al. does not disclose further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal.

Deguchi et al. teaches further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal (C.11 I.55 to C.12 I.14, C.4 I.28-33 & F.10).

Art Unit: 2834

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami et al. device with the detection circuitry of Deguchi et al. since Kawakami et al. controls the pressure of the gas (temperature in the wafer) to address differences in the thickness of the wafer, while Deguchi et al. incorporates a circuitry to sense current thru the electrodes to determine the deviation on the surface of the wafer. The detection/measurement and calculation/control a posteriori results easier and more accurate when working with current values instead of temperature ones.

Regarding claim 4 Kawakami et al. in view of Deguchi et al. discloses the apparatus of claim 3.

Kawakami et al. further discloses wherein said detection circuitry is configured to cause said bi-directional backside conduit to be decoupled from said backside carrier gas supply line and coupled to said vacuum supply line upon a detection of an area of contact area in said wafer (C.10 l.1-29).

Kawakami et al. does not specifically disclose where that detection is based on the curvature of the wafer.

Deguchi et al. teaches further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal (C.11 l.55 to C.12 l.14, C.4 l.28-33 & F.10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami et al. device with the detection circuitry of Deguchi et al. since the apparatus of Kawakami et al needs flat wafers to work to measure accurately the area of contact between wafer and base of the electrostatic chuck. Moreover having a detection of the curvature will help in determining the exact shape of the wafer and based on this operate the cooling gas system.

**Claim 5** is rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. (US 5542559) in view of Deguchi et al. (US 5665166) and Kellerman et al. (US 7033443).

Art Unit: 2834

Regarding claim 5 Kawakami et al. in view of Deguchi et al. discloses the apparatus of claim 4.

Kawakami et al. in view of Deguchi et al. does not disclose detection circuitry is further configured to cause said bi-directional backside conduit to be decoupled from said vacuum supply line and re-coupled to said backside carrier gas supply line upon detecting a desired pressure between said wafer and said chucking pedestal

Kellerman et al. further discloses wherein said detection circuitry is further configured to cause said bi-directional backside conduit to be decoupled from said vacuum supply line and re-coupled to said backside carrier gas supply line upon detecting a desired pressure between said wafer and said chucking pedestal (C.14 I.4-19) <sensing/detection: Deguchi et al. device and calculation/controlling: Kellerman et al. device>).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami et al. device with the controlling device of Kellerman et al. because this controlling advantageously controls an amount of thermal conduction through the cooling gas (Kellerman et al. <C.14 I.8-10>).

**Claims 6-7** are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. (US 5542559) in view of Kellerman et al. (US 7033443).

Regarding claim 6, Kawakami et al. discloses an electrostatic chuck (F.1) with a bi-directional backside conduit (5, 5A, 5B) in communication with a gas supply (56) and a vacuum (57).

Kawakami et al. does not disclose wherein the pedestal has an inner and outer zones each having a top surface beneath the wafer, wherein the zones are mechanically decoupled from one another such the top surface of the outer zone is capable of selective adjustment of both above and below of the top surface of the inner zone.

Kellerman et al. teaches wherein the pedestal has an inner and outer zones each having a top surface beneath the wafer, wherein the zones are mechanically decoupled



Art Unit: 2834

from one another such the top surface of the outer zone is capable of selective adjustment of both above and below of the top surface of the inner zone (C.11 I.50 to C.12 I.13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami et al. device with the inner an outer zones of Kellerman et al. device because it permits the clamping plate to be referenced to a surface flatness of the substrate (Kellerman et al.<C.12 I.10-13>).

Regarding claim 7 Kawakami et al. further discloses comprising means for selectively coupling said bi-directional backside conduit to one of said backside carrier gas supply line and said vacuum supply line (F.1 e.V1 & V2).

**Claims 8-10** are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. (US 5542559) in view of Kellerman et al. (US 7033443) and Deguchi et al. (US 5665166).

Regarding claim 8 Kawakami et al. in view of Kellerman et al. discloses the apparatus of claim 7.

Kawakami et al. in view of Kellerman et al. does not disclose further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal.

Deguchi et al. teaches further comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal (C.11 I.55 to C.12 I.14, C.4 I.28-33 & F.10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kawakami et al. in view of Kellerman et al. device with the with the detection circuitry of Deguchi et al. since Kellerman et al. controls the pressure of the gas (temperature in the wafer) to address differences in the unevenness of the wafer, while Deguchi et al. incorporates a circuitry to sense current thru the electrodes to determine the deviation on the surface of the wafer. The

Art Unit: 2834

detection/measurement and calculation/control a posteriori results easier and more accurate when working with current values instead of temperature ones.

Regarding claim 9 Kawakami et al. in view of Kellerman et al. and Deguchi et al. discloses the apparatus of claim 8.

Kellerman et al. further discloses wherein said detection circuitry is configured to cause said bi-directional backside conduit to be decoupled from said backside carrier gas supply line and coupled to said vacuum supply line upon a detection of an area of contact area in said wafer (C.14 I.4-19) <sensing/detection: Deguchi et al. device and calculation/controlling: Kellerman et al. device>).

Deguchi et al. further teaches comprising detection circuitry for detecting a curvature present in a wafer placed on said chucking pedestal (C.11 I.55 to C.12 I.14, C.4 I.28-33 & F.10).

Regarding claim 10 Kawakami et al. in view of Kellerman et al. and Deguchi et al. discloses the apparatus of claim 9.

Kellerman et al. further discloses wherein said detection circuitry is further configured to cause said bi-directional backside conduit to be decoupled from said vacuum supply line and re-coupled to said backside carrier gas supply line upon detecting a desired pressure between said wafer and said chucking pedestal (C.14 I.4-19).

**Claims 11-13 & 19** are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawakami et al. (US 5542559) in view of Kellerman et al. (US 7033443) and Tong et al. (Patent Application Publication US 2004/0083975).

Regarding claim 11, Kawakami et al. in view of Kellerman et al. discloses the apparatus of claim 6.

Kawakami et al. in view of Kellerman et al. does not disclose comprising a suitable micro-positioning control mechanism associated with each of said inner and



Art Unit: 2834

outer zones of said chucking pedestal, wherein a height of said inner and outer zones are independently adjustable with respect to one another

Tong et al. further discloses comprising a suitable micro-positioning control mechanism associated with each of said inner and outer zones of said chucking pedestal, wherein a height of said inner and outer zones are independently adjustable with respect to one another (Paragraph [0027] & F.6).

Regarding claim 12, Kawakami et al. in view of Kellerman et al. and Tong et al. discloses the apparatus of claim 11.

Tong et al. further discloses wherein said outer zone is configured to be in a raised position with respect to said inner zone when a wafer having a positive radius of curvature with respect to said chucking pedestal is placed upon said chucking pedestal (Paragraph [0028]).

Regarding claim 13, Kawakami et al. in view of Kellerman et al. and Tong et al. discloses the apparatus of claim 12.

Tong et al. further discloses wherein said inner zone is configured to be in a raised position with respect to said outer zone when a wafer having a negative radius of curvature with respect to said chucking pedestal is placed upon said chucking pedestal (Paragraph [0028]).

Regarding claim 19, Kawakami et al. in view of Kellerman et al. and Tong et al. discloses the apparatus of claim 6.

Kellerman et al. further teaches wherein said inner zone is concentrically disposed with respect to said outer zone (F.1 e.120, 122).

Art Unit: 2834

**Claims 14-17** are rejected under 35 U.S.C. §103(a) as being unpatentable over Kellerman et al. (US 7033443) in view of Kawakami et al. (US 5542559):

Regarding claim 14 Kellerman et al. discloses a method (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) for implementing pressure assisted electrostatic chucking, the method comprising: placing a wafer on the pedestal (F.11A e.105), providing a backside gas (F.11A e225 <205C opened & 205B closed>), wherein the pedestal has a plurality of channels up through the top surface (C.12 l.45-48 & F.8B e.153), monitoring pressure to determine when a threshold level of chucking force exists, decoupling gas and coupling vacuum when the actual level of chucking force is less than the threshold (C.14 l.4-19).

Kellerman et al. does not specifically disclose wherein said plurality of gas channels is configured to facilitate vacuum assisted chucking of the wafer.

Kawakami et al. teaches a plurality of gas channels is configured to facilitate vacuum assisted chucking of the wafer (C.7 l.14-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kellerman et al. device with the Kawakami et al. teachings of assisting the holding of the wafer with the vacuum because it prevents the wafer from being blown off the pedestal (Kawakami et al. <C.7 l.14-19>).

Regarding claim 15 Kellerman et al. in view of Kawakami et al. discloses the method of claim 14.

Kawakami et al. further discloses comprising introducing a front side supply of gas in conjunction with said vacuum supply (F.1 e.56, 57).

Regarding claim 16 Kellerman et al. in view of Kawakami et al. discloses the method of claim 14.

Kellerman et al. further discloses comprising decoupling said vacuum supply from said backside of said electrostatic chucking pedestal and coupling said backside of

Art Unit: 2834

said electrostatic chucking pedestal to said backside carrier gas whenever the actual level of chucking force meets said threshold level of chucking force (C.14 I.4-19).

Regarding claim 17 Kellerman et al. in view of Kawakami et al. discloses the method of claim 16.

Kawakami et al. further discloses further comprising increasing an electrostatic chucking voltage applied to said electrostatic chucking pedestal whenever said coupling of said backside of said electrostatic chucking pedestal to said vacuum supply is insufficient to create said threshold level of chucking force (C.3 I.50-65).

**Claim 18** is rejected under 35 U.S.C. §103(a) as being unpatentable over Kellerman et al. (US 7033443) in view of Kawakami et al. (US 5542559) and Katata et al. (US 6500686).

Regarding claim 18 Kellerman et al. in view of Kawakami et al. discloses the method of claim 17.

Kellerman et al. in view of Kawakami et al. does not specifically disclose determining when a wafer is defective.

Katata et al. teaches an apparatus which is able to determine when the wafer is defective (C.8 I.23-29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Kellerman et al. in view of Kawakami et al. device with the defect sensor of Katata et al. because this way increases the efficiency of the electrostatic chuck by not processing defective wafers.

Art Unit: 2834

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luis E. Román whose telephone number is (571) 272 – 5527. The examiner can normally be reached on Mon – Fri from 7:15 AM to 3:45 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571) 272-2800 x 36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from Patent Application Information Retrieval (PAIR) system.

Status information for unpublished applications is available through private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LR/031007

Luis E. Román  
Patent Examiner  
Art Unit 2836

  
BURTON S. MULLINS  
PRIMARY EXAMINER